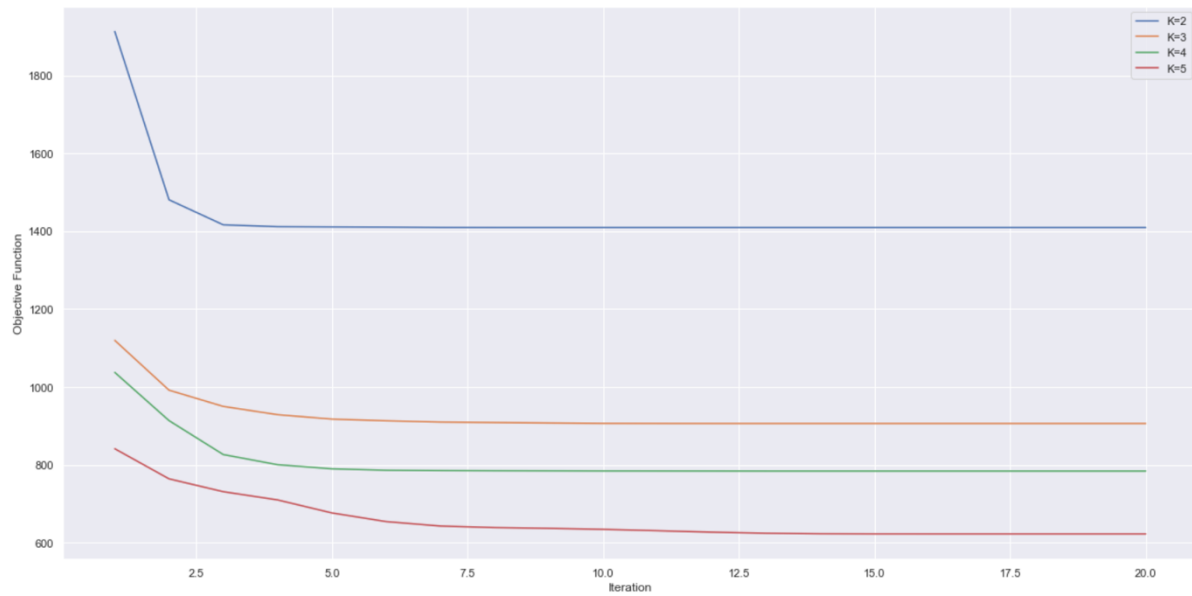


Homework 3

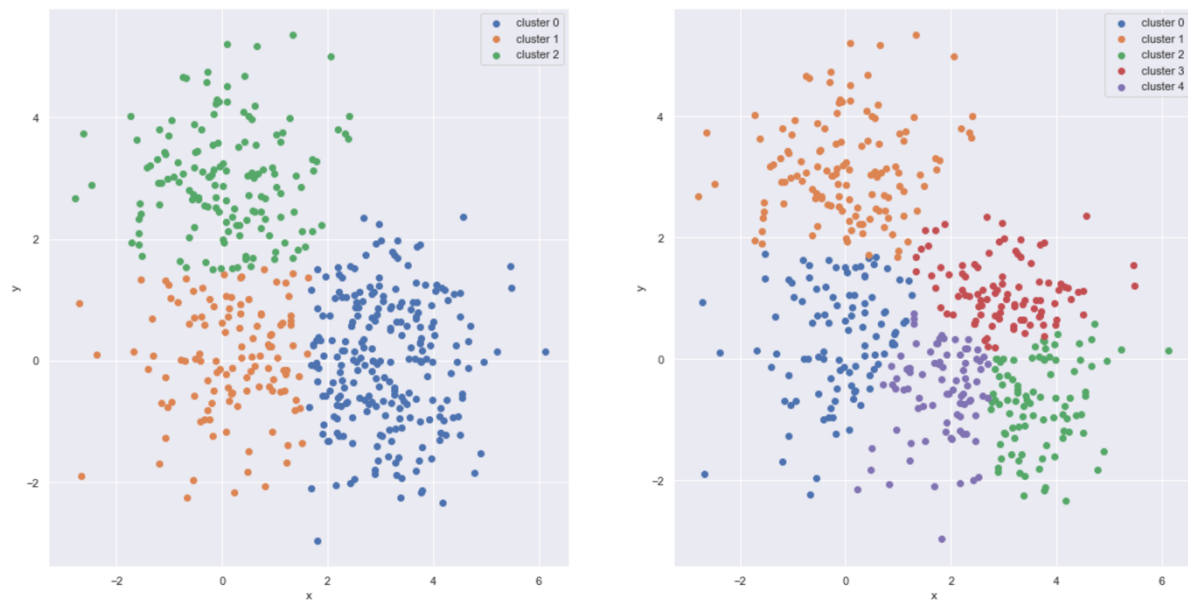
Zichen Pan(zp2197)

Problem 1

(a)

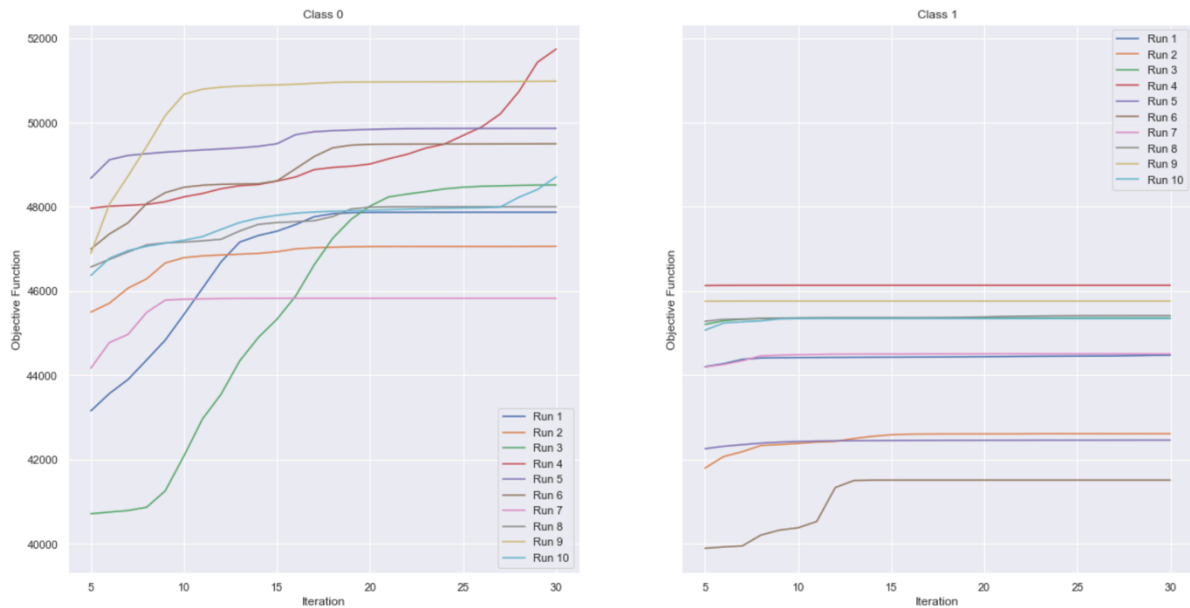


(b)



Problem 2

(a)



(b)

1-Gaussian GMM:

```

                predict_y = 1  predict_y = 0
actual
1                174            8
0                96           182
precision= 0.7739130434782608

```

2-Gaussian GMM:

```

                predict_y = 1  predict_y = 0
actual
1                167           15
0                78           200
precision= 0.7978260869565217

```

3-Gaussian GMM:

```

                predict_y = 1  predict_y = 0
actual
1                170           12
0                73           205
precision= 0.8152173913043478

```

4-Gaussian GMM:

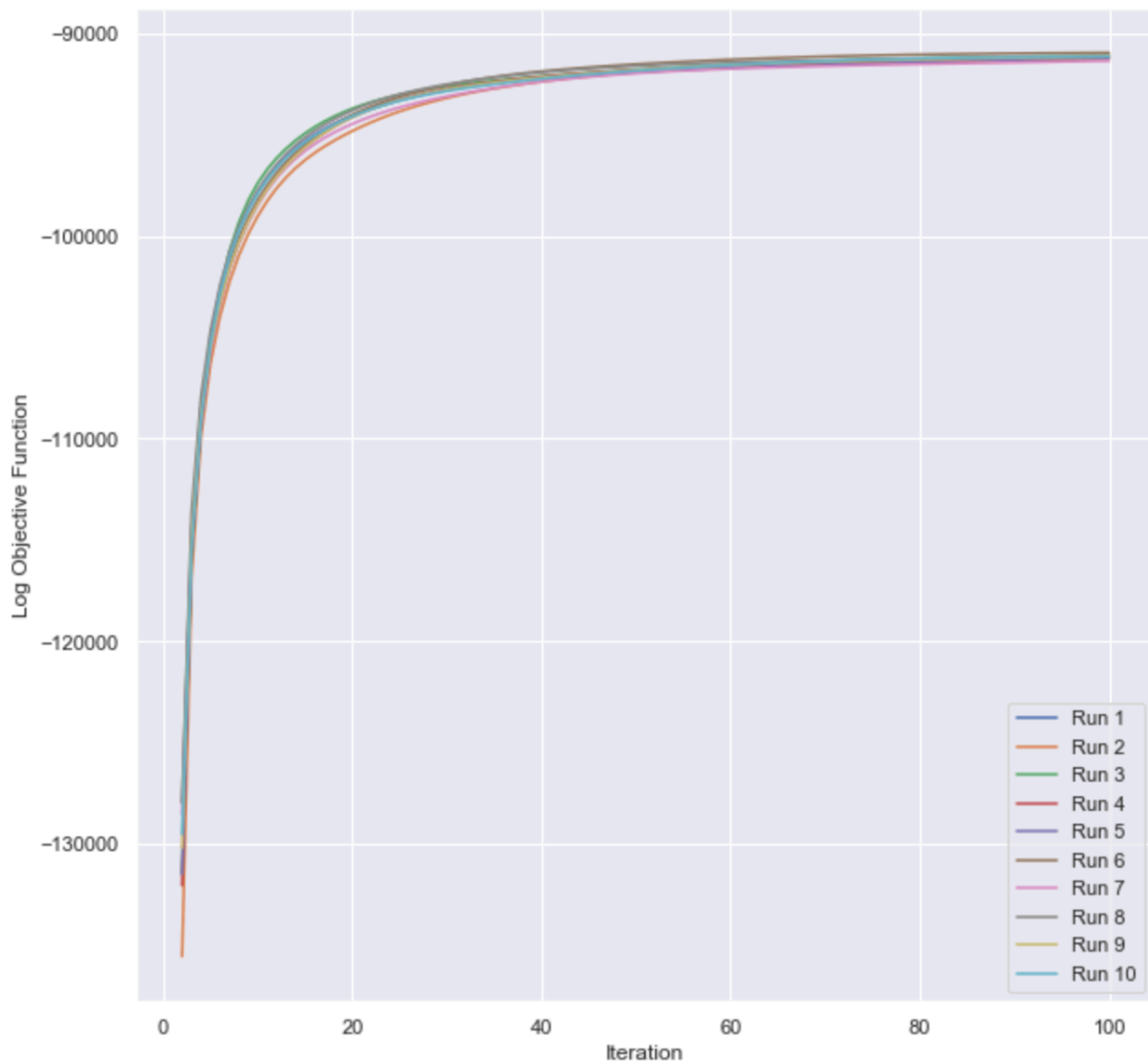
```

                predict_y = 1  predict_y = 0
actual
1                173                9
0                 53               225
precision= 0.8652173913043478

```

Problem 3

(a)



run	log objective function	RMSE
5	-90952.015727	79.161401
2	-91098.872696	79.157046
10	-91109.439371	78.878511
8	-91112.660541	77.953499
3	-91116.849300	78.864430
9	-91125.999104	79.387910
7	-91161.555879	78.025626
4	-91229.125730	79.392526
1	-91267.607380	78.170480
6	-91355.383168	77.572405

(b)

	Query Movie	Nearerst Movies	Distance
0	Star Wars (1977)	Empire Strikes Back, The (1980)	0.10410755386598342
1	Star Wars (1977)	Raiders of the Lost Ark (1981)	0.2861667143982881
2	Star Wars (1977)	Return of the Jedi (1983)	0.40131042654095284
3	Star Wars (1977)	Man Who Would Be King, The (1975)	0.699902363552408
4	Star Wars (1977)	Aliens (1986)	0.7156945699415868
5	Star Wars (1977)	Usual Suspects, The (1995)	0.7426128485828061
6	Star Wars (1977)	Indiana Jones and the Last Crusade (1989)	0.7520131321019097
7	Star Wars (1977)	Blues Brothers, The (1980)	0.8041921753127722
8	Star Wars (1977)	Back to the Future (1985)	0.8457384572278502
9	Star Wars (1977)	Sting, The (1973)	0.8859304838338359
10	My Fair Lady (1964)	Sound of Music, The (1965)	0.7927423599733234
11	My Fair Lady (1964)	American in Paris, An (1951)	1.032924523758363
12	My Fair Lady (1964)	Snow White and the Seven Dwarfs (1937)	1.0564409706426514
13	My Fair Lady (1964)	Babe (1995)	1.0854499658539742
14	My Fair Lady (1964)	Pollyanna (1960)	1.1138930754563547
15	My Fair Lady (1964)	All About Eve (1950)	1.1141053689829086
16	My Fair Lady (1964)	Cinderella (1950)	1.1360581222604003
17	My Fair Lady (1964)	Shadowlands (1993)	1.1955364236312191
18	My Fair Lady (1964)	Critical Care (1997)	1.3168480293768996
19	My Fair Lady (1964)	Pinocchio (1940)	1.3620933057956885
20	GoodFellas (1990)	Once Upon a Time in the West (1969)	0.46348529268269467
21	GoodFellas (1990)	Godfather: Part II, The (1974)	0.523551335659634
22	GoodFellas (1990)	Apocalypse Now (1979)	0.5388234545668968
23	GoodFellas (1990)	Full Metal Jacket (1987)	0.6019876229062304
24	GoodFellas (1990)	Casino (1995)	0.6365753315421367
25	GoodFellas (1990)	Bonnie and Clyde (1967)	0.6989085870636682
26	GoodFellas (1990)	Taxi Driver (1976)	0.7505876838145903
27	GoodFellas (1990)	Platoon (1986)	0.7544588336109831
28	GoodFellas (1990)	Cool Hand Luke (1967)	0.7625850324575341
29	GoodFellas (1990)	Short Cuts (1993)	0.7783840803120203